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ABSTRACT

This paper discusses a concept-based approach to teaching secondary geography. It is intended to help teachers in Australia write suitable geography programs and adopt teaching practices appropriate to the 1980s. A useful way to understand "concept" is to put the idea in a context with the definitions of other words such as fact, information, knowledge, percept, generalization, and principle. Conceptual thinking involves the mental grouping of phenomena. Geography's place in the school curriculum is based on its contribution both to the student's acquisition of useful knowlege about the world in which he lives and to his development of abilities in thinking that can help him understand, cope with, enjoy, and contribute to that world. The teacher has a vital role in the efficiency of concept formation by selecting relevant information, posting appropriate questions, and helping students clarify their ideas. It is important that teachers clarify their understanding of how concepts may be viewed as hierarchial and developmental. Teachers must have an understanding of the learning processes involved in concept formation. They must also be aware of the students' developmental stages and be able to determine the stage of thinking attained by the students.
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CONCEPTS IN GEOGRAPHY AS A BASIS FOR CURRICULUM

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Among the significant recent reorientations in the secondary school curriculum is the attention paid to the development of students' thinking. One approach to understanding this process is to examine how the mind groups phenomena in categories of similarities and relationships, and uses this ability to think effectively in solving problems. In school geography, focus on the development of thinking is revealed in the attention paid to conceptual development by students.

When geography is used in school to contribute to the adolescent's growing intellectual capabilities, the teacher uses strategies which draw out the students' understanding of processes operating in the environment and in society. Distributions of human activities on the earth are not random, but tend to have repeating occurrences, and are thus predictable (Ambrose, 1972, 71). The reason for this is that there are regularities in human decision-making, in space and over time. The discovery, or recognition of common features and relationships, is based upon the ability to apply concepts and principles previously acquired, and to internalize these in thinking patterns or cognitive strategies. School geography taught in this way uses concepts for developing techniques of information processing.

Background to Curriculum Development in Australia.

In the 1970's Australian secondary school geography curricula have responded to a growing body of educational thought which stresses the importance of developing thinking processes and understanding, through a focus on the structure of the disciplines of knowledge. The ideas underlying conceptually derived curricula were clarified by Bruner (1963), applied in the Social Studies by Fenton (1966), and used in the American High School Geography Project (Thomas, 1965).

McCaskill, 1967, outlined a conceptual basis for a senior geography curriculum, and this was most successfully adapted to a junior high school geography course in South Australia, in the early 1970's. Subsequently other Australian State education systems have incorporated the principles of conceptually based curricula in school geography courses.

In New South Wales, the curriculum document which guide teachers, Geography in Years 7 to 10, lists a number of concepts which can be used to implement the aims and objectives of geography teaching.

In Section 4 of this document is a brief statement on concepts, their hierarchical nature, how questions can be used to identify concepts, and lists of concepts which are frequently used by geographers. The 1978 amplification of this document notes that"by the end of year 10, students who have studied geography should be able to use concepts in geographical inquiry."

There has been a lengthy time lag between the reception by leaders of educational change, of concept-based, process-oriented curriculum, and the effective adoption of this orientation in the classroom. Teachers adjusting to the new emphases have asked a number of questions about teaching directed toward concept development. "What are concepts?" "How does oneteach for concept development?" "How is conceptual thinking evaluated?"

Several Australian State Education Departments, through their Syllabus Committees and curriculum officers, have sponsored study groups and in-service teacher education conferences to examine these questions. Teacher education courses have focused on them in their pre-service programs. In 1975 and 1976 the Australian Geography Teachers Association, with the support of the Curriculum Development Centre, Canberra,

arranged for the preparation of a background report, researched and written by Lindsay Francis. This paper, entitled Geosearch Report (1977) presented a comprehensive review of concepts and children's learning in geography. It provides an aid to curriculum designers and teachers working in secondary school geography by drawing together information under these headings:

Concepts in Geography. Structure and Hierarchies

Spatial Stages

Development of Concepts and Skills Associated with Maps and Photographs

Mapping Skills

Learning from Photographs

Development of Concepts at the Secondary School Age Level

Conceptual Learning in Geography by Younger Children

In his conclusions, Francis noted that very little research into adolescent learning in geography has been carried out in Australia, but what studies there have been in U.S.A. and U.K. are of significance as guidelines to practice in the Australian context. He observes that the largest area has been the investigation of map reading and interpretation, but that it appears that there has been little transfer of research findings to classroom practice in Australia.

In accepting Francis's recommendations, the Australian Geography Teachers' Association initiated Geosearch, Stage II, a program for the 1980's with the aim of providing curriculum developers, teachers, and students of geography and social studies with reliable, empirically derived and ethnographic information on the learning and teaching of geography and social studies in Australian primary and secondary schools.

In the meantime, in order to assist teachers write suitable geography programs and adopt teaching practices appropriate to the 1980's, directed to using school geography as a medium for the development of effective cognitive strategies, educational advisors have sought direct answers to the teachers' initial questions - What are concepts? How can they be used in teaching? How evaluated?

What are Concepts?

Acceptance of commonly agreed upon meanings of terms is desirable when teachers are interpreting curricula as they write programs and plan lessons. A useful way to understand "concepts" is to put the idea in a context with other definitions. The use of this approach in pre-service or in-service conference usually leads to discussion and further clarification of the ideas.

FACT: A statement of objective reality which can be verified by evidence.
(Example: Sydney is located at $34^{o}S$, $151^{o}E$).

INFORMATION: Facts or figures ready to communicate.
(cf. information as signal input to a computer)

KNOWLEDGE: Facts or information which an individual has available to communicate.

PERCEPT: Sensory experience of objects or events. Everyone lives in an experiential continuum made up of perceptions of external and internal events described in terms of sight, smell, sound, feeling. (For some psychologists perception is a form of cognition.)

CONCEPT: The mental grouping of objects or events.

GENERALIZATION: A statement of relationships between or among concepts.

PRINCIPLE: A widely inclusive or fundamental statement or proposition from which others are derived, or on which they are based.

In addition, the term "content" is one used commonly by teachers writing programs in geography. Content usually refers to facts, information and knowledge about man and the earth.

CONTENT AND CONCEPTS

Geography's place in the school curriculum is based on its contribution both to the student's acquisition of useful knowledge about the world in which he lives and to his development of such abilities in thinking that he can understand, cope with, enjoy and contribute to that world.

The argument that acquisition of knowledge of facts about human and earth phenomena alone is of limited value underlies the emphasis on concept development. The environment is tremendously diverse, and facts about the world and its people so multifarious that were we to use fully our capacity for registering the differences in things and respond to each event as unique we would soon be overwhelmed by the complexity of the environment (Brune., et al, 1967, 1). Conceptual thinking involves the mental grouping of phenomena. The more effectively the individual develops and uses concepts, the more effectively he is able to use his perceptions and knowledge. Forming concepts helps the individual by reducing the complexity of the environment, providing a means by which objects can be identified, and reduces the need for constant learning. (Joyce and Weil, 1972, 110).

Concepts will develop whether or not geography teachers are involved, (MacDonald, 1976, 25), but the teacher has a vital role in the efficiency of concept formation by selecting relevant information, posing appropriate questions and helping students clarify their ideas (HMIS, 1978, 7).

LEVELS OF CONCEPTS

One of the problems encountered in the introduction of conceptually oriented teaching to Australian geography teachers was the failure to help them clarify their understanding of how concepts may be viewed as hierarchical and developmental, using guidelines such as Geography in Years 7 to 10, in which are listed key concepts in geography, without elaboration of the hierarchical character of concepts has apparently proved confusing to some teachers.

Concept formation and refinement may be described in terms of the growing intellectual capability of the individual. Piaget has described a series of stages of development, in which, during adolescence, the student progresses from concrete operations in which he can apply logical thought to problems concerned with stimuli directly experienced, to formal operations in which he can, in addition, apply logical thought to problems expressed in abstractions. Thus concepts which are simple categorizations of concrete, directly experienced phenomena are learned first. Examples of such concepts are "river," "valley," "mountain." Perceptual experiences of the phenomenal world lead to thinking about these experiences, and then to the formation of symbolic representations of them, most commonly in language and as labeling words.

At the other end of the hierarchy are the socalled higher-order concepts, expressed in abstract terms which are most inclusive and widely

applicable. Not all geographers agree about which of these are fundamental in geography, but those commonly identified in geographical literature include association, change, direction, distribution, scale, interaction, location, movement, and region. Between the lower order and higher order concepts may be discerned a hierarchy of increasing inclusiveness and abstraction. The differentiation is sometimes revealed in extensions of particular concepts, as reflective thinking reveals deeper insights. For example the concept "river" can be extended as knowledge of the attributes of riversgrows. Equally important, the fundamental concepts have applicability at an elementary level of understanding, and can be extended to conceptual levels challenging the mature thinker. Recognition of this hierarchy in concepts is the entry point for spiral planning of geography programs, by means of which teachers revisit concepts and various age levels, extending the concepts appropriately for the stage of thinking of the students.

One attempt to indicate the hierarchical nature of this continuum is that of Marsden (1976, 39) who explores two dimensions, the concrete-abstract, and the technical-vernacular. The former dimension is useful to consider in program planning because, as noted, it has important parallels with the development of the adolescent's thinking. The latter dimension is significant in planning the systematic introduction to the geography student of the special words in the sub-vocabulary of geography. The following is a development and extension of Marsden's four-fold classification.

1. Concrete vernacular concepts.

   These are objects or events with a limited number of attributes, which can be observed directly. River, valley, hill, farm.

2. Concrete technical concepts, Level A.

   Objects or events with a greater number of attributes, still to be observed directly. Town, desert, forest, industrial landscape.

3. Concrete technical concepts, Level B.

   Organizing concepts which are comprised of sets of lower order concepts. Weather, latitude, area, scale, climate, relief, boundary.

4. Abstract vernacular concepts.

   Terms in common usage to indicate sets of ideas expressed as abstractions. Communication, power, values and beliefs, conflict, change, similarities.

5. Abstract technical concepts.

   Terms commonly used in text books and curriculum documents. System, water cycle, sequent occupance, inertia, friction of distance, economic competition, environmental perception.

6. Key concepts in geography.

   The most inclusive, abstract concepts in the discipline. Location, distribution, association, interaction, region.

7. Principles.

   (a) The distance principle: That the distance, however measured, between two locations, conditions the degree of interaction between them.

   (b) The spatial implication principle: That once an event has occurred at a location, the probability of other events occurring in the vicinity is either increased or diminished. (Ambrose, 1972, 72). Ambrose claims that

these two principles are the only "thoroughly reliable and useful geographical principles" and that they are of fundamental importance and wide generality. He notes that the spatial implication principle applies to almost anything in the landscape, and that "the tracing out of these implication, the understanding of the mechanisms by which they have effect and the prediction of the land use changes that might result are the central aims of geographical analysis." (Ambrose, 1972, 73).

CONCEPT FORMATION

Identifying and summarizing the essential information from the research into concept formation, and presenting it in a suitable manner to assist teachers to implement conceptually-oriented curricula is a formidable task. At best this is only in an elementary stage in Australia, despite the inclusion of studies of child development in pre-service teacher education.

The work of Piaget and Inhelder (1963) pointing to the emergence of formal operations in early adolescence provides a starting point for examination of concept development in the context of high school geography. Gagne's (1970) description of eight types of learning identifies concept learning as one aspect in a hierarchy. To Gagne concept learning occurs when the learner shows the ability to make common responses to classes of stimuli which differ widely from each other in some obvious attribute. For example, in the technical dimension noted above, "mountain" has a specific set of attributes agreed upon in geographical literature, and although the appearance of mountains may vary greatly (because of size, vegetation cover, shape, rock type) the ability to recognize common

attributes (namely high summit altitude, high local relief, steep slopes, limited summit area) indicates mastery of the concept.

The acquisition of concepts presupposes the ability to discriiminate, to allot objects or ideas to particular sets, to distinguish exemplars from non exemplars. Language aids the formation of concepts, but as Marsden (1976, 32) notes the ability to state a verbal definition alone is not enough to reveal concept attainment.

Some of the problems encountered by (especially younger) teachers when their students fail to handle concepts which the teacher had expected they would, might be resolved by helping them clarify the stage of thinking attained by the students. Having attained capabilities in thinking in a hypothetico-deductive manner, the student is freed from the constraints of his immediate experience or environment. The limitations which frustrate teachers (and learners) are gradually lifted and students can start to solve problems by assuming certain premises and working out their implications. Deserts are sometimes studied in year 8 by students aged 13-14 years. Some of these students may be ready to understand that the main cause of deserts is their location in the latitudes which are the perennial location of higher atmospheric pressure, in which descending air is increasing its capacity to absorb and hold moisture. Other students may not understand this relationship and so fail to answer adequately a question asking why deserts are located in these latitudes.

A task sometimes used with pupils aged 14-15 years is to explain the location of a factory. Many variables operate in this situation, and the student explaining the location needs to have the capacity to keep in mind various relationships. If he has progressed to formal

thinking he is able to build a mental model of operations required in order to arrive at an adequate explanation. Teachers can use the Metfab game of the High School Geography Project as a diagnostic tool to see how effectively their students are operating in this context. "The most clear-cut evidence that a student is in the stage of formal operations is when he shows the ability to solve (or attempt to solve) a problem by putting forward various hypotheses and rejecting them until he has found one that seems useful for dealing with that problem" (Graves, 1972, 168).

One view of concept formation is by the processes of assimilation, accommodation and definition (MacDonald, 1976, 25). An understanding of these processes enable the teacher to reflect on his strategies in the classroom.

Assimilation. Particular details can be emphasized to produce a single generalization from them. Commonly, questions directed to lower age/ability groups elicit concrete responses. The teacher groups these and provides structure such that the concepts of higher generality are understood and labelled. For example, interconnecting roads, tributaries and rivers, pipelines distributing water in a city all form networks. Networks vary in distance, size, capacity, complexity according to the scale at which they are studied.

Accommodation. Learning occurs when simple ideas are extended by additions which enrich the meaning. "Ship" as a concept may be enriched by including "ferry," "liner," "tanker," "ore carrier," "trawler," and "car ferry."

Definition and Redefinition. Piaget describes the formation of schemata, in turn revealing themselves to be inadequate, and reforming at a higher level, given the appropriate challenge to do so. Children achieve

learning in this way when they find more familiar synonyms for new terms, or can give examples from their own knowledge. In doing so they clarify their own definition of the term.

TEACHING FOR CONCEPT DEVELOPMENT.

The task of the professional teacher is to diagnose his students and progress to the achievement of goals in the cognitive and affective areas. Unless the development of students' thinking by means of concept development is basic in his approach to curriculum implementation, the program and its educative outcome will be limited and will suffer the consequences of the criticisms levelled in the past at inadequate and unsatisfactory school geography. In turn school geography stands to be challenged and needs to defend its place in school curriculum as an excellent medium for the development of thinking. We have now reached a point of departure for the 1980's where the following are needed.

1. Further discussion of the utility of the concept-based approach to curriculum.
2. Information about teaching strategies appropriate for efficient promotion of concept development through the medium of geography in school.
3. Adequate channels for the diffusion of information to teachers, whose confidence in reorienting their approach depends greatly on the effective receipt of ideas that are practical and philosophically sound.
4. Research and production of materials (such as test items) which may be used to evaluate conceptual learning.

These are tasks for the 1980's.

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